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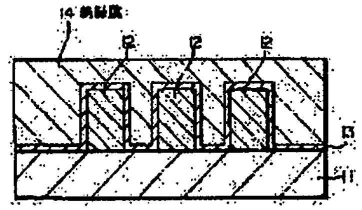
(54) MANUFACTURE OF INSULATION FILM BY MEANS OF CHEMICAL VAPOR PHASE EPITAXY

(57)Abstract:
PURPOSE: To form a so-called low dielectric coefficient film having high embedding ability and a low dielectric coefficient by using material gas including at least methylfluorosilane and water or methylfluorosilane and hydrogen peroxide.
CONSTITUTION: Material gas to be used for chemical vapor phase epitaxy should include at least methylfluorosilane and water or methylfluorosilane and hydrogen peroxide. For example, a plurality of interconnections 12 are formed on a substrate 11, and then a protection film 13 is formed by means of plasma CVD to cover the respective interconnections 12. Then material gas being a mixture of Si (CH3)2F2, Si (CH3) F3 and H2O is introduced to a low pressure CVD apparatus to form an insulation film 14 of silicon oxide on the protection film 13. Then after a silicon oxide film is formed by means of CVD as another insulation film 15 on an upper face of the insulation film 14, annealing is performed to remove moisture in the insulation film 14.



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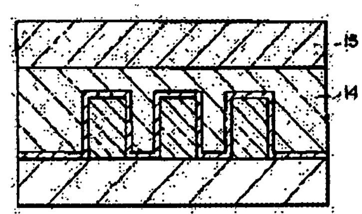

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention relates to the manufacture method of the insulator layer by the chemical vapor growth used for the device process of a design rule 0.25 micrometers or less about the formation technology of the insulator layer of a semiconductor device.
[0002]
[Description of the Prior Art] Low dielectric constant-ization of a layer insulation film is considered as one of the meanses for realizing them with the demand of detailed-izing of a semiconductor device, low-power-izing, improvement in the speed, etc. The low dielectric constant material indicated now has lowered the dielectric constant by containing a carbon atom or a fluorine atom. Now, the with a dielectric constant of about 1.5 to 2.5 thing is realized.
[0003] Organic [SOG] (SOG is the abbreviation for Spin on glass), the polyimide, the poly PARAKI silylene, etc. are known for the low dielectric constant material containing a carbon atom. It is said that such material is that a carbon atom is included as an alkyl group, is lowering the density of material and making own polarizability of a molecule low, and has a low dielectric constant. Moreover, as for such material, the dielectric constant only has the indispensable thermal resistance as a material of not only a low but a semiconductor device. Organic [SOG] is having siloxane structure, and a polyimide is having imido combination, the poly PARAKI silylene is having the benzene ring, and it has thermal resistance, respectively.
[0004] As for the low dielectric constant material containing a fluorine atom, acid fluoride silicon (SiOF) is known. This material is carrying out termination of the silicon-oxygen-silicon (Si-O-Si) combination with a fluorine (F) atom, and lowering density, that own polarizability of a fluorine is low, etc. have lowered the dielectric constant owing to. Of course, this material is excellent also in thermal resistance.
[0005] On the other hand, in order to embed between wiring, the so-called gap philharmonic capacity and global flattening capacity are required not only for a low dielectric constant film but an insulator layer. The so-called APL (abbreviated name of Advanced Planarization Layer) technology is observed as a method excellent in gap philharmonic capacity. This APL technology is the method of embedding it between narrow wiring, as slushes a liquid by setting up substrate temperature so that all the gas used for material gas may become below the boiling point, and making material gas liquefy on a substrate front face.
[0006] That is, it is the method of holding substrate temperature before and after 0 degree C, and performing a chemical vapor growth to material gas using a mono silane (SiH_4) and a hydrogen peroxide (H_2O_2). Therefore, the insulator layer which becomes a configuration like the state where the substrate front face trickled and piled the liquid from a silicon oxide (SiO_2) is formed. With this APL technology, there is gap philharmonic capacity embedded to a level difference for an aspect ratio to be about four, and there is global flattening capacity which embeds 10-micrometer square flatly mostly. And since it stops showing behavior like a liquid when substrate temperature is raised to 10 degrees C or more, it is known that gap philharmonic capacity and global flattening capacity will decline.
[0007]
[Problem(s) to be Solved by the Invention] Although the APL technology explained by the above-mentioned Prior art is the technology which was excellent about the configuration on the front face of membrane formation, it is inadequate in that a low dielectric constant film is formed. since the specific inductive capacity of the insulator layer formed with APL technology is four to about five, only specific inductive capacity of the same grade as the silicon ** oxide film which formed membranes by the chemical vapor-growth (CVD [say / Following CVD] is the abbreviation for Chemical Vapour Deposition) method using the SOG (Spin on glass) film generally known or the ozone (O_3)-tetrapod ethoxy silane (TEOS) is obtained Since the film by which it was formed with APL technology is a silicon oxide (SiO_2), though a dielectric constant is lowered ideally, specific inductive capacity falls only to about 3.8. Moreover, a dielectric constant becomes high from a silicon oxide with the film formed by APL technology being natural since the hydroxyl group (-OH) which has the effect which raises specific inductive capacity into a film is contained.
[0008] Then, SiO_2 In order to make membranous specific inductive capacity lower than 3.8, the technology which is made to mix a fluorine (F) atom and lowers specific inductive capacity to about 3.0 into a film is examined by recently. However, moreover it embeds without using a fluorine (F), since the influence a fluorine (F) affects a semiconductor device is not clear, and the formation technology of an insulator layer with high capacity is searched for.
[0009] this invention aims to let embedding capacity offer the manufacture method of the insulator layer by the chemical vapor

growth excellent in forming the so-called high and low dielectric constant film with low specific inductive capacity.
[0010]
[Means for Solving the Problem] this invention is the manufacture method of the insulator layer by the CVD made in order to attain the above-mentioned purpose. That is, the 1st method is the manufacture method of the insulator layer by the CVD using the material gas which contains a methyl FURORO silane, water, or a methyl FURORO silane and a hydrogen peroxide at least. The 2nd method is the manufacture method of the insulator layer by the CVD using the material gas which contains a methylsilane and a hydrogen peroxide at least. The 3rd method is the manufacture method of the insulator layer by the CVD using the material gas which contains a methyl chlorosilicane, water, or a methyl chlorosilicane and a hydrogen peroxide at least.
[0011]
[Function] Organic [SOG] (Spin on glass) is known as one of the low dielectric constant films. This is what transposed at least one of four joint hands of a silicon (Si) atom to the alkyl group, and is the so-called silicone resin. When an alkyl group combines with a silicon atom, organic [SOG] becomes a low dielectric constant, because the network of combination is cut off and traffic of the electron between molecules is lost. Moreover, membranous density is also low in order that a chemical combination may go out. The rate of electronic polarization is small, the former is with a bird clapper, the latter is that the molecularity per [to polarize] unit volume decreases, and the dielectric constant is low.
[0012] The manufacture method of the insulator layer by the above-mentioned CVD is the method of forming organic [SOG] by CVD, and since a methyl FURORO silane, a methylsilane, or a methyl chlorosilicane is used for material gas and membranes are formed by CVD, the low dielectric constant film which has gap philharmonic capacity and global flattening capacity is formed. That is, since the gas which contains an alkyl group in the material gas used for the manufacture method of the insulator layer by Above CVD is used, at least one of four joint hands of a silicon atom is transposed to an alkyl group by the CVD reaction.
[0013] An example of the morphosis of the organic SOG film by the above-mentioned CVD is explained below by the case where a methyl FURORO silane [Si (CH3) two F2] and water (H2 O) are used. The methyl FURORO silane of material gas and H2 O heat, make it evaporate, and are separately introduced into a reaction chamber. The reaction in a reaction chamber is as follows.
[0014]
[Formula 1]
Si(CH3)2 F2+2H2 O ->Si2 (CH3) (OH) 2+2HF** ... (1)
[0015]
[Formula 2]
2Si2 (CH3) 2 ->HOSi(CH3)2 OSi(CH3)2 OH+H2 O ... (2)
[0016] Moreover, it is as follows when a methylsilane and a hydrogen peroxide are used.
[0017]
[Formula 3]
Si(CH3)2 H2+2H2 O2 ->Si2 (CH3) (OH) 2+2H2 O ... (3)
[0018]
[Formula 4]
2Si2 (CH3) 2 ->HOSi(CH3)2 OSi(CH3)2 OH+H2 O ... (4)
[0019] Moreover, it is as follows when a methyl chlorosilicane and water are used.
[0020]
[Formula 5]
Si(CH3)2 Cl2+2H2 O ->Si2 (CH3) (OH) 2+2HCl** ... (5)
[0021]
[Formula 6]
2Si2 (CH3) 2 ->HOSi(CH3)2 OSi(CH3)2 OH+H2 O ... (6)
[0022] By repeating such polymerization reaction, the silicon system oxide film containing the alkyl group (here methyl group) will be formed. Thus, since an alkyl group is included, the specific inductive capacity of this silicon system oxide film becomes lower than the silicon-oxide (SiO2) film which does not contain an alkyl group. moreover, the inside to which, as for the above-mentioned polymerization reaction, a polymerization does not go since the reaction is comparatively slow -- this film -- a liquid -- it acts for obtaining Therefore, in this CVD, it will have both gap philharmonic capacity and global flattening capacity. the above-mentioned explanation -- Si (CH3) two F2, Si (CH3) two H2, and Si(CH3)2 Cl2 although related and explained -- others -- Si (CH3) -- Cl3, Si(CH3) F3, and Si(CH3) H3 etc. -- it is -- even if -- it becomes the same reaction
[0023] Moreover, when a hydrogen peroxide (H2 O2) is used instead of water (H2 O), in (1) formula, oxygen (O2) occurs with hydrogen fluoride (HF). Moreover, in (5) formulas, oxygen (O2) occurs with a hydrogen chloride (HCl).
[0024]
[Example] as the example of the 1st invention -- this invention -- low -- the manufacture method of a dielectric constant insulator layer and the process process before and behind it are combined, and the manufacturing process view of drawing 1 explains This drawing 1 is the cross section of wiring structure using the insulator layer which formed membranes using the manufacture method of this invention.
[0025] As shown in (1) of drawing 1, two or more wiring 12 was formed on the substrate 11 with the known wiring formation technology which consists of the membrane formation process of a wiring material, a lithography process, an etching process, etc.

An element (illustration ellipsis) is formed for example, on a semiconductor substrate, and, as for the above-mentioned substrate 11, an insulator layer (illustration ellipsis) is formed in a wrap state in the element. Then, the protective coat 13 was formed in the wrap state for each wiring 12. This protective coat 13 protects a substrate 11 and wiring 12 from the water component generated in case the silicon system oxide film of this invention formed in the upper surface side is formed, an alcoholic component, etc., prevention of a corrosion is achieved by it and the hot carrier resistance of a transistor is secured.

[0026] Next, an example of the manufacture method of the above-mentioned protective coat 13 is explained. Using for example, oxidization dinitrogen (N2 O) as gas which contains a mono silane (SiH4) and an oxygen atom (O) as gas which contains a silicon atom in material gas, helium (helium) was mixed as dilution (conveyance) gas to it, and it introduced into capacity-coupling type plasma CVD equipment (illustration ellipsis). And RF power was supplied to inter-electrode [of plasma CVD equipment], and the protective coat 13 was formed at the thickness of 50nm on the above-mentioned substrate 11 arranged in this plasma CVD equipment. At the time of formation of a protective coat 13, the degree of vacuum in this plasma CVD equipment makes it 100Pa, a substrate 11 is heated at 350 degrees C, and it is 13.56MHz RF power 1.0 W/cm2 It impressed by density.

[0027] Next, the insulator layer 14 of a silicon-oxide system was formed by the method of this invention on the above-mentioned protective coat 13.

[0028] An example of the manufacture method of the above-mentioned insulator layer 14 is explained. The material gas was introduced into material gas at the general low pressure CVD system (illustration ellipsis) using what mixed water (H2 O) as matter for disassembling for example, a methyl FURORO silane [Si (CH3) two F2, Si(CH3) F3], etc. and a halogen as gas containing a silicon atom. The flow rate of the above-mentioned material gas was set to dimethyl JIFURORO [silane (CH3) Si two F2]:25sccm, methyl TORIFURORO silane [Si(CH3) F3]:25sccm, and water (H2 O):200sccm. Hereafter, sccm expresses the volumetric flow rate (a part for cm3/) in reference condition.

[0029] In this low pressure CVD system, the diffusion board (illustration ellipsis) for diffusing introductory gas is formed. And the above-mentioned diffusion board was held at 100 degrees C, and the insulator layer 14 was formed in the thickness of 800nm. At the time of formation of an insulator layer 14, the degree of vacuum in a low pressure CVD system was set to 200Pa, and the substrate 11 was cooled at 0 degree C.

[0030] Thus, in the insulator layer 14 which formed membranes, since the alkyl group (here methyl group) was combined with silicon and the network of combination is cut off, the rate of electronic polarization becomes small. Moreover, since membranous density becomes low, the molecularity per [to polarize] unit volume decreases. By it, membranous specific inductive capacity becomes low. moreover, the inside to which, as for the CVD reaction by the material gas of this invention, a polymerization does not go since the reaction is comparatively slow -- this film -- a liquid -- it acts for obtaining Therefore, in the insulator layer 14, specific inductive capacity is set to 2.5-3.5, there is gap philharmonic capacity to aspect ratio =4, and the degree of global flattening was able to maintain the configuration with a wiring interval almost flat to 10 micrometers.

[0031] Subsequently, as shown in (2) of drawing 1 , thickness formed in the upper surface of the above-mentioned insulator layer 14 the silicon-oxide (SiO2) film which is 0.3 micrometers by CVD as another insulator layer 15. As this deposition method, it is besides CVD, for example, there is a sputtering method or the applying method.

[0032] Next, annealing was performed in order to remove the moisture in the above-mentioned insulator layer 14. In this annealing, 400-degree C nitrogen (N2) atmosphere performed annealing for 15 minutes as an inactive atmosphere using the furnace annealing furnace generally used, for example.

[0033] In forming a multilayer interconnection furthermore, as shown in drawing 2 expressed with the outline cross section, it carries out opening of the contact hole 16 to the protective coat 13 explained by above-mentioned drawing 1 , an insulator layer 14, and another insulator layer 15 if needed. Then, the conductive plug 17 is formed in this contact hole 16. Subsequently, wiring 21 and a protective coat 22 are formed by the method same with having used and explained above-mentioned drawing 1 on the insulator layer 15 according to above. And an insulator layer 23 (equivalent to the insulator layer 14 of drawing 1) is formed by the method of this invention. Then, another insulator layer 24 is formed by the method same with having explained using (2) of above-mentioned drawing 1 . Annealing is performed after that and the moisture in an insulator layer 23 is removed. Thus, a multilayer interconnection can be formed if it carries out by repeating the process explained by above-mentioned drawing 1 .

[0034] Although two kinds of methyl FURORO silanes were used in the example of invention of the above 1st, this is for controlling the mixing ratio of the methyl group in a film. Si two F2 (CH3) Although the rate of a methyl group will increase and a dielectric constant will fall if it increases, the part and membraneous quality deteriorate. On the other hand, it is Si(CH3) F3. Membraneous quality becomes good although the rate of a methyl group will decrease if it increases. What is necessary is just to introduce a silicon tetrafluoride (SiF4), when membraneous quality is furthermore required. Moreover, although water (H2 O) was used as matter for disassembling a halogen, it is also possible to use a hydrogen peroxide (H2 O2), for example. The conditions at that time are the same as that of water.

[0035] Although the above-mentioned substrate temperature was furthermore set as 0 degree C, this substrate temperature should just be set as the temperature to which at least one kind of gas of the material gas liquefies. Therefore, substrate temperature is set up more highly than the congealing point of at least one kind of gas of the material gas, and an upper limit is set as 50 degrees C. When set below to the congealing point, material gas sublimates and does not liquefy. Moreover, it does not evaporate and liquefy at temperature higher than 50 degrees C. Therefore, substrate temperature is set as the above-mentioned temperature requirement.

[0036] Next, the example of the 2nd invention is explained. Since this example is the same as the example of the 1st invention of

the above except the manufacture method of an insulator layer 14 explained by above-mentioned drawing 1 , using above-mentioned drawing 1 , the manufacture method of an insulator layer 14 is explained and explanation of other component parts is omitted here.
[0037] Hereafter, an example of the manufacture method of an insulator layer 14 is explained. The material gas was introduced into the general low pressure CVD system (illustration ellipsis) using what mixed the hydrogen peroxide (H2 O2) as matter for oxidizing a methylsilane [Si (CH3) two H2, Si(CH3) H3], etc. and hydrogen as gas which contains a silicon atom in material gas. The flow rate of the above-mentioned material gas was set to [methylsilane (CH3) Si two H2]:25sccm, methylsilane [Si(CH3) H3]:25sccm, and hydrogen-peroxide (H2 O2):200sccm.
[0038] In this low pressure CVD system, the diffusion board (illustration ellipsis) for diffusing introductory gas is formed. And the above-mentioned diffusion board was held at 100 degrees C, and the insulator layer 14 was formed in the thickness of 800nm. At the time of formation of an insulator layer 14, the degree of vacuum in a low pressure CVD system was set to 200Pa, and the substrate 11 was cooled at 0 degree C.
[0039] Thus, in the insulator layer 14 which formed membranes, since the alkyl group (here methyl group) was combined with silicon and the network of combination is cut off, the rate of electronic polarization becomes small. Moreover, since membranous density becomes low, the molecularity per [to polarize] unit volume decreases. By it, membranous specific inductive capacity becomes low. moreover, the inside to which, as for the CVD reaction by the material gas of this invention, a polymerization does not go since the reaction is comparatively slow -- this film -- a liquid -- it acts for obtaining Therefore, in the insulator layer 14, specific inductive capacity is set to 2.5-3.5, there is gap philharmonic capacity to aspect ratio =4, and the degree of global flattening was able to maintain the configuration with a wiring interval almost flat to 10 micrometers.
[0040] Hereafter, as above-mentioned drawing 1 explained, the silicon-oxide (SiO2) film whose thickness is 0.3 micrometers by CVD as another insulator layer 15 on the upper surface of an insulator layer 14 was formed. As this deposition method, it is besides CVD, for example, there is a sputtering method or the applying method.
[0041] Next, annealing was performed in order to remove the moisture in the above-mentioned insulator layer 14. In this annealing, 400-degree C nitrogen (N2) atmosphere performed annealing for 15 minutes as an inactive atmosphere using the furnace annealing furnace generally used, for example.
[0042] And what is necessary is just to carry out by repeating the process which gave [above-mentioned] explanation, in forming a multilayer interconnection. Consequently, the multilayer-interconnection structure of structure as shown in above-mentioned drawing 2 can be formed.
[0043] Although two kinds of methylsilanes were used in the example of the 2nd invention of the above, this is for controlling the mixing ratio of the methyl group in a film. Si two H2 (CH3) Although the rate of a methyl group will increase and a dielectric constant will fall if it increases, the part and membraneous quality deteriorate. On the other hand, it is Si(CH3) H3. Membraneous quality becomes good although the rate of a methyl group will decrease if it increases. What is necessary is just to introduce a silicon tetrafluoride (SiF4), when membraneous quality is furthermore required.
[0044] Although the above-mentioned substrate temperature was furthermore set as 0 degree C, this substrate temperature should just be set as the temperature to which at least one kind of gas of the material gas liquefies. Therefore, substrate temperature is set up more highly than the congealing point of at least one kind of gas of the material gas, and an upper limit is set as 50 degrees C. When set below to the congealing point, material gas sublimates and does not liquefy. Moreover, it does not evaporate and liquefy at temperature higher than 50 degrees C. Therefore, substrate temperature is set as the above-mentioned temperature requirement.
[0045] Next, the example of the 3rd invention is explained. Since this example is the same as the example of the 1st invention of the above except the manufacture method of an insulator layer 14 explained by above-mentioned drawing 1 , using above-mentioned drawing 1 , the manufacture method of an insulator layer 14 is explained and explanation of other component parts is omitted here.
[0046] Hereafter, an example of the manufacture method of an insulator layer 14 is explained. The material gas was introduced into the general low pressure CVD system (illustration ellipsis) using what mixed water (H2 O) for example, with the methyl chlorosilicane [Si(CH3)2 Cl2] as matter for disassembling a halogen as gas which contains a silicon atom in material gas. The flow rate of the above-mentioned material gas was set to methyl [Si(CH3)2 chlorosilicane Cl 2]:50sccm and hydrogen-peroxide (H2 O2):200sccm.
[0047] In this low pressure CVD system, the diffusion board (illustration ellipsis) for diffusing introductory gas is formed. And the above-mentioned diffusion board was held at 100 degrees C, and the insulator layer 14 was formed in the thickness of 800nm. At the time of formation of an insulator layer 14, the degree of vacuum in a low pressure CVD system was set to 200Pa, and the substrate 11 was cooled at 0 degree C.
[0048] Thus, in the insulator layer 14 which formed membranes, since the alkyl group (here methyl group) was combined with silicon and the network of combination is cut off, the rate of electronic polarization becomes small. Moreover, since membranous density becomes low, the molecularity per [to polarize] unit volume decreases. By it, membranous specific inductive capacity becomes low. moreover, the inside to which, as for the CVD reaction by the material gas of this invention, a polymerization does not go since the reaction is comparatively slow -- this film -- a liquid -- it acts for obtaining Therefore, in the insulator layer 14, specific inductive capacity is set to 2.5-3.5, there is gap philharmonic capacity to aspect ratio =4, and the degree of global flattening was able to maintain the configuration with a wiring interval almost flat to 10 micrometers.
[0049] Hereafter, as above-mentioned drawing 1 explained, the silicon-oxide (SiO2) film whose thickness is 0.3 micrometers by

CVD as another insulator layer 15 on the upper surface of an insulator layer 14 was formed. As this deposition method, it is besides CVD, for example, there is a sputtering method or the applying method.
[0050] Next, annealing was performed in order to remove the moisture in the above-mentioned insulator layer 14. In this annealing, 400-degree C nitrogen (N2) atmosphere performed annealing for 15 minutes as an inactive atmosphere using the furnace annealing furnace generally used, for example.
[0051] And what is necessary is just to carry out by repeating the process which gave [above-mentioned] explanation, in forming a multilayer interconnection. Consequently, the multilayer-interconnection structure of structure as shown in above-mentioned drawing 2 can be formed.
[0052] Although one kind of methyl chlorosilicane was used in the example of this 3rd invention, it is also possible to use two kinds of methyl chlorosilicanes [Si(CH3)2 Cl2 and Si(CH3) Cl3], for example. This is for controlling the mixing ratio of the methyl group in a film, and is Si(CH3)2 Cl2. Although the rate of a methyl group will increase and a dielectric constant will fall if it increases, the part and membraneous quality deteriorate. On the other hand, it is Si(CH3) Cl3. Although the rate of a methyl group will decrease and membraneous quality will become good if it increases, a dielectric constant becomes high by chlorine (Cl). What is necessary is just to introduce a silicon tetrafluoride (SiF4), when membraneous quality is furthermore required. Moreover, although water (H2 O) was used as matter for disassembling a halogen, it is also possible to use a hydrogen peroxide (H2 O2), for example. The conditions at that time are the same as that of water.
[0053] Although the above-mentioned substrate temperature was furthermore set as 0 degree C, this substrate temperature should just be set as the temperature to which at least one kind of gas of the material gas liquefies. Therefore, substrate temperature is set up more highly than the congealing point of at least one kind of gas of the material gas, and an upper limit is set as 50 degrees C. When set below to the congealing point, material gas sublimates and does not liquefy. Moreover, it does not evaporate and liquefy at temperature higher than 50 degrees C. Therefore, substrate temperature is set as the above-mentioned temperature requirement.
[0054]
[Effect of the Invention] As mentioned above, as explained, it can accumulate using the material gas which has an alkyl group in CVD according to this invention, and when an alkyl group combines with a silicon atom, the insulator layer of low specific inductive capacity can be formed. moreover, the inside to which, as for the CVD reaction by the material gas of this invention, polymerization reaction does not go since the reaction is comparatively slow -- this film -- a liquid -- it acts for obtaining Therefore, the insulator layer excellent in gap philharmonic capacity and global flattening capacity can be formed. Therefore, since the insulator layer of this invention is excellent in embedding capacity, improvement in the yield and reliability can be aimed at as an insulator layer of a semiconductor device, and since specific inductive capacity can reduce the capacity between wiring of a semiconductor device for a low reason, improvement in the speed of an element and low-power-ization can be attained.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the manufacturing process view of the example of this invention.
[Drawing 2] It is explanatory drawing of the example of formation of a multilayer interconnection.
[Description of Notations]
14 Insulator Layer

[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1] The material gas used by the aforementioned chemical vapor growth in the manufacture method of the insulator layer by the chemical vapor growth is the manufacture method of the insulator layer by the chemical vapor growth characterized by including a methyl FURORO silane, water, or a methyl FURORO silane and a hydrogen peroxide at least.
[Claim 2] The material gas used by the aforementioned chemical vapor growth in the manufacture method of the insulator layer by the chemical vapor growth is the manufacture method of the insulator layer by the chemical vapor growth characterized by including a methylsilane and a hydrogen peroxide at least.
[Claim 3] The material gas used by the aforementioned chemical vapor growth in the manufacture method of the insulator layer by the chemical vapor growth is the manufacture method of the insulator layer by the chemical vapor growth characterized by including a methyl chlorosilicane, water, or a methyl chlorosilicane and a hydrogen peroxide at least.
[Claim 4] It is the manufacture method of the insulator layer by the chemical vapor growth characterized by setting more highly than the congealing point of one kind of gas of the aforementioned material gas the substrate temperature in the aforementioned chemical vapor growth as 50 degrees C or less in the manufacture method of the insulator layer by the chemical vapor growth according to claim 1.
[Claim 5] It is the manufacture method of the insulator layer by the chemical vapor growth characterized by setting more highly than the congealing point of one kind of gas of the aforementioned material gas the substrate temperature in the aforementioned chemical vapor growth as 50 degrees C or less in the manufacture method of the insulator layer by the chemical vapor growth according to claim 2.
[Claim 6] It is the manufacture method of the insulator layer by the chemical vapor growth characterized by setting more highly than the congealing point of one kind of gas of the aforementioned material gas the substrate temperature in the aforementioned chemical vapor growth as 50 degrees C or less in the manufacture method of the insulator layer by the chemical vapor growth according to claim 3.

[Translation done.]